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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/819,370	03/28/2001	Yoshiaki Watanabe	225-010254-US(PAR)	4335

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FAIRFIELD, CT 06824

EXAMINER

MONDT, JOHANNES P

ART UNIT	PAPER NUMBER
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2826

DATE MAILED: 09/25/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

09/819,370

Applicant(s)

WATANABE ET AL.

Examiner

Johannes P Mondt

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-7 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1 and 4-7 is/are rejected.
- 7) ☒ Claim(s) 2 and 3 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 4.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

## DETAILED ACTION

### ***Information Disclosure Statement***

The examiner has considered the item listed in the Information Disclosure Statement of Paper No. 4.

### ***Claim Rejections - 35 USC § 102***

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. ***Claims 1 and 4-7*** are rejected under 35 U.S.C. 102(b) as being anticipated by Chen et al (5,982,804). Chen et al teach (cf. Figures 3 and 14) a semiconductor laser comprising:

an active layer 11 made of semiconductor (*claim 1*), particularly one active bulk or single (quantum well) or multiple quantum well layer of  $\text{In}_{1-x}\text{Ga}_x\text{As}_{1-y}\text{P}_y$  (*claim 5*) (cf. column 4, lines 42-43);

a ridge stripe 15 (cf. column 4, line 51) having a cladding layer 12 (cf. column 4, line 53) formed on said active layer 11 (*claim 1*), said cladding layer being made of InP (cf. column 4, line 44) (*claim 5*) and a contact layer 13 (cf. column 4, lines 45-46) formed on the cladding layer to protrude from said active layer (*claim 1*), said contact layer being made of InGaAsP (cf. column 4, lines 45-46) (*claim 6*);

a pair of gratings 120 (cf. column 8, line 23) each having a periodic structure in a longitudinal direction of the ridge stripe having a plurality of grooves each extending

from side walls of the ridge stripe on flat portions in both sides of the ridge stripe (see Figure 14) (*claim 1*); said pair of bracket gratings further comprise bracket grating portions each having a slope surface extending from a flat top portion of the ridge stripe to a top face of a land portion defined by the adjacent grooves and coupling the side walls of the ridge stripe and the gratings (cf. column 6, lines 54-62 and Figure 14) (*claim 4*).

said pair of gratings being periodic variations of the index of refraction (cf. column 5, lines 14-15) and hence, according to the Kramers-Kronig relations, periodic variations of absorption, hence having absorbing layers covering the surfaces of the grooves of gratings to absorb excited light (*claim 1*); while Chen et al also teach the semiconductor laser to have an active layer, either bulk, single (quantum well) or multiple quantum well layer (see claim 2 by Chen et al) composed of  $\text{In}_{1-x}\text{Ga}_x\text{As}_{1-y}\text{P}_y$  (cf. column 10, lines 27-32) while the cladding layer is made of InP (cf. column 10, lines 27-32).

Finally, with regard to *claim 7*: this limitation is met as a direct consequence of the final structure, because waveguide layer 111 (without grating) is located beneath and gratings 120 are coupled laterally thereto by dint of their location and orientation (cf. column 8, line 27 and Figure 14).

### ***Claim Rejections - 35 USC § 103***

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the

invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. **Claim 1** is rejected under 35 U.S.C. 103(a) as being unpatentable over Fiddymment et al. (4,805,184) in view of Chen et al (Electronics Letters 32 (14), pp. 1288-1290).

Fiddymment et al teach a semiconductor laser (cf. abstract, lines 8-9) comprising:

an active layer 4 made of a semiconductor (cf. column 5, lines 38-43);

a ridge stripe 7 (cf. column 5, lines 57-67) having a cladding layer 5 (cf. column 5, lines 35-45) formed on said active layer and a contact layer 15 (cf. column 6, lines 44-45) formed on the cladding layer to protrude from said active layer;

a pair of gratings 6 (cf. column 5, lines 45-57) each having a periodic structure in a longitudinal direction of the ridge stripe having a plurality of grooves each extending from side walls of the ridge stripe flat portions in both sides of the ridge stripe (cf. column 5, lines 51-53).

However, it has long been understood that periodic gratings in distributed feedback laser devices can be exploited to implement the gain-coupling mechanism by providing absorptive grating with periodic variation of the absorption coefficient, as shown by for instance Chen et al (cf. abstract), and the lasers in which this mechanism to achieve improved effective coupling coefficient (cf. page 1288).

*Motivation* to include the teaching by Chen et al in this regard in the invention taught by Fiddymment et al is thus found in the expected rise in the

effective coupling coefficient and consequently in the net gain. The inventions can be easily *combined* to cover the surfaces of the grooves of the gratings with material that absorbs light of the wavelength excited by the laser. *Success* in implementing the combination can therefore be *reasonably expected*.

3. **Claim 4** is rejected under 35 U.S.C. 103(a) as being unpatentable over Fiddymment et al and Chen et al as applied to claim 1 above, and further in view of Stegmüller (4,761,791). As detailed above, claim 1 is unpatentable over Fiddymment et al in view of Chen et al, neither of whom, however, necessarily teach the further limitation of claim 4. However, as shown by Stegmüller, it has long been known in the art of gratings for ridge semiconductor laser devices (cf. title, abstract, and column 1, lines 6-20) that the grating structure can be made in an uninterrupted manner to include what Applicant calls bracket grating portions, i.e., portions that extend over the ridge and possibly over the laser active region (see Figures 2). Note that the grating in Stegmüller is a periodic variation of the refractive index, and thereby, in light of the Kramers-Kronig relations, also a periodic variation of the absorption coefficient.

*Motivation* to do so also in the invention essentially taught by Fiddymment et al stems from the advantage of avoiding the need to interrupt the epitaxial manufacturing method of the double-hetero-layer device, as explained in Stegmüller, thereby improving the quality of the device and reducing the expense of the manufacturing process (cf. column 1, lines 37-55). The inventions can be *easily combined*, because all that is needed to implement the relevant teaching of Stegmüller in this regard is to extend the

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steps listed in column 4, lines 15-33, in Fiddymment et al to the include the ridge stripe area 7, while this would obviously also make it possible to perform said steps in one cycle. *Success* in implementing the teaching of Stegmüller in this regard can therefore be *reasonably expected*.

### ***Allowable Subject Matter***

4. ***Claims 2 and 3*** are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. The following is a statement of reasons for the indication of allowable subject matter: the closest art to claim 2 is Osowski et al, made of record by Applicant in Information Disclosure Statement of Paper No. 4. However, in Osowski et al the second insulator layer is lacking. No art has been found in which the absorbing layer in absorptive or loss grating in a semiconductor laser comprises an insulator material as matrix and metal particles dispersed therein.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Johannes P Mondt whose telephone number is 703-306-0531. The examiner can normally be reached on 8:00 - 18:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nathan J Flynn can be reached on 703-308-6601. The fax phone numbers

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for the organization where this application or proceeding is assigned are 703-308-7722 for regular communications and 703-308-7724 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

JPM  
September 19, 2002



NATHAN J. FLYNN  
SUPERVISORY PATENT EXAMINER  
TECHNOLOGY CENTER 2800